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EXAMINER	
AL HASHIMI, SARAH	
ART UNIT	PAPER NUMBER
2853	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/680,928	**Applicant(s)** TUMER, ARTHUR MONROE	10
Examiner Sarah Al-Hashimi	**Art Unit** 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the support pads 44 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 44A-B in Fig. 2A. Corrected drawing sheets in compliance with 37 CFR

1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 13,15,16,39 recite the limitation "said scanning device/structure" in line 2 of each of the claims and **claim 15** recited the limitation " the scan velocity " in line 1, claim 13 recited the limitation "the resonant frequency". **Claim 42** recited the limitation "the scanning engine". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-4,6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans 5,629,730 in view of Schlafer 3,544,201.

Neukermans teaches:

Claim 1: A pivotally oscillating structure (Fig 1a) said structure comprising: a support structure (fig. 12a #211); a device comprising a functional surface supported by a pair of torsional hinges for pivotally oscillating around said pair of torsional hinges (Fig 12A #205 torsion bars, #203 mirror), each one of said pair of torsional hinges extending from said functional surface to an anchor member(fig. 12a #207 frame), said anchor member attached to said support structure(Fig12a #207, #209,#211).

Claim 2: The oscillating structure further comprising drive apparatus for causing said functional surface to pivotally oscillate about said torsional hinges (Fig. 12b #225 driver electrodes).

Claim 3: The oscillating structure wherein said anchor member is a support frame mounted to said support structure(Fig12a #207, #209,#211).

Claim 4: The oscillating structure wherein said anchor member is a pair of support pads mounted to said support structure (fig 12a #209).

Claim 12: The oscillating structure further comprising sensor apparatus for providing an electrical signal representative of a selected parameter of said pivotal oscillations of said functional surface (col 11 line 5 "piezo sensors" that detect stress in the torsion bars thereby sensing a change in the resonant frequency of the mirror and light beams reflected affected by changes in the stress on the torsional bars).

Claim 13: The oscillating structure wherein said functional surface pivotally oscillates at the resonant frequency of said scanning device (col 7 lines 59-60 "force members which apply electrostatic or electromagnetic forces to the mirror making the mirror resonate at principal torsional frequency" of the scanning device").

Claim 17: The oscillating structure of claim 12 wherein said sensor apparatus comprising a piezoelectric element (col 11 line 5 “piezo sensors”).

Claim 18: The oscillating structure of claim 12 wherein said sensor apparatus comprises a piezoresistant element (col 11 line 5 “piezo sensors”).

Claims 20&21: The oscillating structure of claim 13 or claim 1 wherein said functional surface of said scanning device is a reflective surface (Fig 12A #203 mirror) and further comprising a light source (Fig 9 #174 light beam there must be a light source in order for their to be a light beam) for directing light to said reflective surface such that said scanning device moves a beam of light according to a selected pattern (para 11 “mirror can deflect different beams” indicating a variety of patterns it can move a beam of light).

Claim 22&23: The oscillating structure of claim 21 or claim 20 wherein said scanning structure operates as the scanning device of a laser printer (col 1 lines 9-10 “beam scanners are used in...optical reading and writing systems” such as a laser printer).

Claim 24: The oscillating structure of claim 20 wherein said scanning structure operates as a scanning device of a projection imaging system (col 1 lines 9-10 “beam scanners are used in digital imaging” which is a projection imaging system).

Claim 25: The oscillating structure of claim 1 wherein said device further comprises a second pair of torsional hinges for providing motion orthogonal to said pivoting motion (Fig. 12A #207, #209 torsion bars are perpendicular to each other such that #209 provides motion orthogonal to #207).

Claim 31: A method of adjusting a parameter of a pivotally oscillating structure having a functional surface comprising the steps of: supporting a functional surface by a pair of torsional hinges extending between said functional surface and an anchor member such that said functional surface pivotally oscillates about said pair of torsional hinges (Fig 12A #205 torsion bars, #203 mirror); mounting said anchor member to a support structure (fig. 12a #207 frame);

Claim 32: The method of claim 31 further comprising the step of providing a drive force to pivotally oscillate said functional surface (Fig. 12b #225 driver electrodes).

Neukermans does not teach the following limitations but Schlafer teaches them:

Claim 1: apparatus for adjusting a parameter of said pivotal oscillations and apparatus coupled to said device for selectively adjusting the stress loading on said pair of torsional hinges to change a parameter of said pivotal oscillations (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts" adjusting the stress load on the hinges and affecting a parameter of oscillations such as resonant frequency).

Claim 5: The oscillating structure of claim 1 wherein said apparatus for adjusting the stress loading on said pair of torsional hinges applies at least one of tension and compression forces to said pair of torsional hinges (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts". The expansion or contraction of the piezoelectric material will apply a force of tension or compression on the hinges adjusting the stress load).

Claim 6: The oscillating structure of claim 2 wherein said apparatus for adjusting the stress loading on said pair of torsional hinges applies at least one of tension and compression forces to said pair of torsional hinges (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts". The expansion or contraction of the piezoelectric material will apply a force of tension or compression on the hinges adjusting the stress load).

Claim 7: The oscillating structure of claim 6 wherein said apparatus for adjusting said stress loading is responsive to an electrical control signal (col 4 lines 50-53 "piezoelectric material ..expands or contracts in accordance with ..voltage applied").

Claim 8: The oscillating structure of claim 5 wherein said apparatus for adjusting is a piezoelectric element responsive to said electrical control signal (col 4 lines 50-53 "piezoelectric material ..expands or contracts in accordance with ..voltage applied").

Claim 9: The oscillating structure of claim 5 wherein said apparatus for adjusting is an electromagnetic device responsive to said electrical control signal (col 4 line 47 "magnetostrictive or bimetallic transducers may be utilized").

Claim 10: The oscillating structure of claim 7 wherein said apparatus for adjusting is a piezoelectric element responsive to said electrical control signal (col 4 lines 50-53 "piezoelectric material ..expands or contracts in accordance with ..voltage applied").

Claim 11: The oscillating structure of claim 7 wherein said apparatus for adjusting is an electromagnetic device responsive to said electrical control signal (col 4 line 47 "magnetostrictive or bimetallic transducers may be utilized").

Claim 31: adjusting the stress loading on said pair of torsional hinges to adjust a selected parameter of said pivotally oscillating structure (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts" adjusting the stress load on the hinges and affecting a parameter of oscillations such as resonant frequency).

Claim 33: The method of claim 31 wherein said step of adjusting said stress loading comprises the step of applying at least one of tension and compressional forces to said pair of torsional hinges(col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts". The expansion or contraction of the piezoelectric material will apply a force of tension or compression on the hinges adjusting the stress load).

Claim 34: The method of claim 33 wherein said step of applying comprises the step of mounting a piezoelectrical element (fig1 #11 #13 piezo mounted to support) for applying said one of tension and compression forces to said pair of torsional hinges by providing electrical signals to distort said piezoelectric element (col 4 lines 50-53 "piezoelectric material ..expands or contracts in accordance with ..voltage applied").

Therefore it would have been obvious to a person having skill in the art to modify Neukerman's torsional scanner to incorporate Schlafer's apparatus for adjusting a parameter of said pivotal oscillations and apparatus coupled to said device for selectively adjusting the stress loading wherein said apparatus for adjusting said stress loading is responsive to an electrical control signal and said apparatus for adjusting is a piezoelectric element or electromagnetic device responsive to said electrical control signal to better respond to fluctuations in the resonant frequency and scan velocity and provide a superior quality image.

Neukermans further teaches:

Claim 36: The method of claim 34 further comprising the step of sensing a selected parameter as said functional surface pivotally oscillates around said torsional hinges and providing a signal representative of said selected parameter (col 11 line 5 "piezo sensors" that detect stress in the torsion bars thereby sensing a change in the resonant frequency of the mirror and light beams reflected affected by changes in the stress on the torsional bars).

5. Claims 14-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans in view of Schlafer, and further in view of Klement US 2003/0169055.

Neukermans teaches:

Claim 26: A scanning device pivotally oscillating at its resonant frequency (col 7 lines 59-60 "force members which apply electrostatic or electromagnetic forces to the mirror making the mirror resonate at principal torsional frequency" of the scanning device") and including apparatus for maintaining said resonant frequency within a selected range (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts" adjusting the stress load on the hinges and affecting a parameter of oscillations such as resonant frequency), said scanning device comprising: a support structure (fig. 12a #211); a reflective surface pivotally supported by a pair of torsional hinges (Fig 12A #205 torsion bars, #203 mirror), each hinge of said pair of torsional hinges extending from said reflective surface to an anchor member (fig. 12a #207 frame), said anchor member attached to said support structure(Fig12a #207, #209,#211); a sensor for providing an electrical signal representative of a selected one of the parameters scan velocity and said resonant frequency of said oscillating mirror (col 11 line 5 "piezo sensors" that detect stress in the torsion bars thereby sensing a change in the resonant frequency of the mirror and light beams reflected affected by changes in the stress on the torsional bars); and a light source (Fig 9 #174 light beam there must be a light source in order for their to be a light beam) for directing light to said reflective surface such that said scanning device moves a beam of light back and forth across a target (Fig 9 light beams in figure).

Claim 27: The scanning device of claim 26 further comprising circuitry for modulating said beam (col 11 lines 35-36) of light as it moves back and forth (col 1 line14 "the beam sweeps back and forth") and a moving photosensitive medium for receiving and spacing successive modulated moving beams of light to form an image (Fig 11 #197 object to be scanned must be sensitive to light rendering it photosensitive).

Claim 28: apparatus for providing orthogonal motion to said moving beam of light such that successive modulated light beams combine to form an image (col 11 line 29 "provide scanning in an orthogonal axis" such that light beams combine to form an image).

Claim 29: The scanning device of claim 28 wherein said reflective surface further comprises a second pair of torsional hinges to provide said orthogonal motion(Fig. 12A #207, #209 torsion bars are perpendicular to each other such that #209 provides motion orthogonal to #207).

Claim 30: The scanning device of claim 28 further comprising a second reflective surface for providing said orthogonal motion (col 2 lines 21-22 "both plates may be mirrors").

Schlafer in view of Neukermans teaches:

Claim 26: apparatus coupled to said anchor member for applying at least one of tension and compression forces to said pair of torsional hinges in response to an electrical control signal (col 4 lines 49-52 " piezoelectric transducer.. characterized by the fact that their length expands and contracts" adjusting the stress load on the hinges and affecting a parameter of oscillations such as resonant frequency);

Schlafer in view of Neukermans does not teach but Klement teaches:

Claim 14: for providing said electrical control signal to adjust said stress loading so as to maintain said selected parameters between a selected minimum value and a selected maximum value (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency" which inherently will have a minimum and maximum value).

Claim 16: The oscillating structure of claim 13 wherein said selected parameter is the resonant frequency of said scanning structure (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency").

Claim 19: The oscillating structure of claim 12 wherein said sensor apparatus comprises a light source (Fig. 3 #22) and one or more light intensity sensors (para 20 line 1 "two sensors") arranged so that the intensity of light received at said one or more intensity sensors varies with the position of the oscillating mirror (Fig. 3 a&b).

Claim 26: a control circuit for receiving said electrical signal from said sensor and for providing said electrical control signal to adjust said stress loading between a selected minimum value and a selected maximum value (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency" which inherently will have a minimum and maximum value).

Claim 35: The method of claim 31 further comprising the step of monitoring a selected parameter as said functional surface pivotally oscillates around said torsional hinges and providing a signal representative of said selected parameter (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency" where the adjustment in the resonant frequency is a signal representative of said selected parameter).

Claim 37: The method of claim 35 wherein said selected parameter is the resonant frequency of said functional surface pivotally oscillating around said torsional hinges(para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency").

Claim 39: The method of claim 36 further comprising the steps of receiving said signal representative of said sensed parameter, and generating said signals applied to said piezoelectric element so as to maintain the selected parameter of said pivotal oscillation of said scanning device between a selected minimum level and a selected maximum level (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency" which inherently will have a minimum and maximum value).

Claim 40: The method of claim 31 wherein said selected parameter is the resonant frequency of said scanning device (para 34 lines 1-3 "resonant scanner controller would continuously detect shifts in the device's resonant frequency and adjust drive frequency to match the resonant frequency").

Therefore it would have been obvious to a person having skill in the art to modify Neukerman's apparatus in view of Schlafer to incorporate Klement's said electrical control signal to adjust said stress loading so as to maintain said selected parameters wherein selected parameter is the resonant frequency of said scanning structure and sensor apparatus comprises a light source and one or more light intensity sensors arranged so that the intensity of light received at said one or more intensity sensors varies with the position of the oscillating mirror and a control circuit for receiving said electrical signal from said sensor and for providing said electrical control signal to adjust said stress loading and the step of monitoring a selected parameter as said functional surface pivotally oscillates around said torsional hinges and providing a signal representative of said selected parameter because using an electronic sensor apparatus to monitor resonant frequency will improve device performance.

6. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans in view of Schlafer, and further in view of Mizoguchi US 20040135644.

Neukermans in view of Schlafer do not teach the following limitations, however, Mizoguchi teaches:

Claim 15: The oscillating structure wherein said selected parameter is the scan velocity of said scanning structure (para 37 lines 5&6 "the induced voltage ... is responsive to the angular velocity").

Claim 38: The method of claim 35 wherein said selected parameter is the scan velocity of said functional surface pivotally oscillating around said torsional hinges (para 37 lines 5&6 "the induced voltage ... is responsive to the angular velocity of the scan mirror").

Claim 41: The method of claim 39 wherein said functional surface of said scanning structure is a reflective surface and further comprising the step of directing a beam of light on to said reflective surface to provide a scanning beam of light(Fig 12 and fig 14 #805 mirror).

Neukermans further teaches:

Claim 42: The method of claim 41 further comprising the steps of mounting said scanning structure in a printer for use as the scanning engine (col 1 lines 9-10 "beam scanners are used in...optical reading and writing systems" such as a laser printer).

Claim 43: The method of claim 41 further comprising the step of mounting said scanning structure in a display device for use as the scanning engine(col 1 lines 9-10 "beam scanners are used in digital imaging" used as a display device).

Claim 44: The method of claim 41 further comprising the step of modulating said scanning beam of light and receiving said modulated scanning beam of light at a photosensitive target (Fig 13).

Claim 45: The method of claim 44 wherein said photosensitive target is a display screen and further comprising the step of moving said modulated beam of light orthogonal to said scanning motion to form an image on said display screen(Fig 12).

Claim 46: The method of claim 44 further comprising the step of moving said photosensitive target orthogonal to said scanning motion to form an image on said moving photosensitive target (Fig 13).

Therefore it would have been obvious to a person having skill in the art to modify Neukerman's apparatus in view of Schlafer to incorporate Mizoguci's the oscillating structure wherein said selected parameter is the scan velocity of said scanning structure and the method wherein said selected parameter is the scan velocity of said functional surface pivotally oscillating around said torsional hinges because the scan velocity is a factor in image quality and making necessary adjustments to the scan velocity will result in a better quality image.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Al-Hashimi whose telephone number is 571 272 7159. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272 2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S.A.

LAMSON NGUYEN
PRIMARY EXAMINER
09/07/06